

## **REMARKS**

Claims 1-3 and 19-25 were rejected as being anticipated by Takenouchi (U.S. Patent No. 5,744,758).

Applicant has hearing amended claims 1, 3, 4, 7, 21, and 25-28, and canceled claims 22-24, 30, and 31.

Takenouchi does not disclose that the central insulating layer has second through holes having substantially same diameter, and each of the second through holes has a plating film formed on a wall of the corresponding second through hole and the conductive layers located on the both size of the central insulating layer to connect the corresponding first through hole and the corresponding second through hole, as recited in claims 1 and 3. Rather, as shown in Fig. 6, Takenouchi discloses a circuit pattern 22 located on the front surface of the central insulation layer 14 to cover the via-hole 18 and a thermoplastic resin layer 16 located on the rear surface of the central insulation layer 14 to cover the via-hole 18. Accordingly, Takenouchi have different materials on the front and back sides of the central insulation layer 14, which may occur warping in a printed wiring board. In contrast, since the present invention has a plating film covering the wall of the through hole and conductive layers located on the both size of the central insulating layer, it is possible to prevent warping from occurring in the printed wiring board. Accordingly, we believe that the present invention of claims 1 and 3 and their dependent claims 21 and 25 distinguishes over Takenouchi.

Claim 4 was rejected as being anticipated by Noddin (U.S. Patent No. 6,132,853).

Noddin does not disclose that the external insulating layer comprises synthetic resins and inorganic fillers, as recited in claim 4. Rather, Noddin discloses using glass-

epoxy resin. When using the glass-epoxy resin, it is difficult to form a fine pattern with via-holes of small diameter. In contract, since the present invention the external insulating layer comprises synthetic resins and inorganic fillers, it is possible to form such a fine pattern, thereby obtaining a high-density printed circuit board. Furthermore, inorganic fillers secure rigidity, thereby avoiding displacement in circuit that connects the external insulating layer and the internal insulating layer to secure electrical connectivity and connection reliability. Accordingly, we believe that the present invention of claim 4 distinguishes over Noddin.

Claims 7, 10, 15, and 26-29 were rejected as being anticipated by Lebaschi (U.S. Patent No. 5,764,485).

#### **Claim 7**

Lebaschi does not disclose that each of the insulating layers is formed of resin base materials containing synthetic resins and inorganic fillers or cloth base materials containing synthetic resins and inorganic cloth, as recited in claim 7. The resin base materials or cloth base materials contain inorganic fillers, making it is possible for the insulating layers to maintain rigidity. Therefore, layer shape is maintained even if a through hole is formed by laser. Furthermore, this makes the layers heat resistant such that, when solder is filled in the through holes, the layers do not deform. Lebaschi does not disclose insulating layers containing inorganic fillers.

#### **Claim 15**

Lebaschi does not disclose (1) a conductor circuit connecting an electronic component with the covering pad, (2) a metal plating film electrically connecting the annular pad and the covering pad, (3) the metal plating film covering a wall of the interconnecting through hole and the bottom of the interconnecting through hole defined by the covering pad such that the wall and the bottom of the interconnecting through hole have a flat surface, and (4) a solder ball for external connection bonded on a

surface of the annular pad at a position offset from the interconnecting through hole, all as recited in claim 15. Rather, Lebaschi discloses filling the through hole with solder paste. Since Lebaschi does not disclose using a metal plating film to have a flat surface of a wall and a bottom of the through hole, if the solder is fused, a flat surface would not be obtained. Furthermore, since the conductor circuit of Lebaschi is formed within the substrate, it is not possible to connect an electronic component with a covering pad as in the present invention. Accordingly, we believe that the present invention of claims 7 and 15 and their dependent claims 10 and 26-29 distinguishes over Lebaschi.

Claim 18, 30, and 31 were rejected as being unpatentable over Lebaschi in view of Takenouchi.

Since claim 18 depends from independent claim 15, we believe that the present invention of claim 18 is not obvious over Lebaschi in view of Takenouchi.

Respectfully submitted,

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